

Review 23 L'Hospital's Rule

Indeterminate forms $\frac{0}{0}$, $\frac{\infty}{\infty}$

$$\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)}$$

other indeterminate forms

$\infty - \infty$ $0 \cdot \infty$ $\frac{\infty}{0}$ can't use
 $0 \cdot \infty$ 0^0 ∞^0 L'Hospital's
 do algebra

Ex 1

$$\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$$

$$\lim_{x \rightarrow 0} \frac{\frac{1}{2}(1+x)^{-\frac{1}{2}}}{1} = \frac{1}{2}$$

Apr 7-10:40 AM

Apr 7-10:47 AM

Ex 2

$$\lim_{x \rightarrow \infty} \frac{\ln x}{2\sqrt{x}}$$

$$\lim_{x \rightarrow \infty} \frac{\frac{1}{x}}{2 \cdot \frac{1}{2} x^{-\frac{1}{2}}}$$

$$\lim_{x \rightarrow \infty} \frac{\sqrt{x}}{x} = \lim_{x \rightarrow \infty} \frac{1}{\sqrt{x}} = 0$$

Ex 3

$$\lim_{x \rightarrow 0^+} \frac{\ln x}{\tan x} = -\infty \quad \frac{\infty}{0}$$

$$\lim_{x \rightarrow 0} \frac{1}{x} = \infty$$

$$\frac{1}{0}$$

Apr 7-10:49 AM

Apr 7-10:53 AM

Ex 4 $\lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}} = y$

1^∞ $\lim_{x \rightarrow \infty} \ln(1+x)^{\frac{1}{x}} = \ln y$

$\lim_{x \rightarrow \infty} \frac{1}{x} \ln(1+x) = \ln y$

$\frac{0}{0}$ $\lim_{x \rightarrow 0} \frac{\ln(1+x)}{x} = \ln y$

$\lim_{x \rightarrow 0} \frac{\frac{1}{1+x}}{1} = 1 = \ln y$
 $y = e$

Apr 7-10:59 AM